

NOTES ON SOME SALAMANDERS OF WARNER'S HOLLOW, ASHTABULA COUNTY, OHIO

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A few years ago there appeared in the pages of this journal an account of a biologically interesting spot in southwestern Ashtabula County, called Warner's Hollow (Joseph, 1950). This account indicates that Warner's Hollow is an especially fine habitat for salamanders, stating that "the Caudata are represented here by *Triturus viridescens* (most numerous), *Plethodon jordani*, and *Eurycea lucifuga*. These forms of the Caudata are so plentiful that they may be observed crawling about in the wooded areas and among the rocky ledges of the Hollow all day long." This report of the latter two species in northeastern Ohio is particularly noteworthy, inasmuch as *Eurycea lucifuga* has previously been recorded no farther north in Ohio than the southwestern section (Bishop, 1943) and *Plethodon jordani* is a species apparently confined to the southern Appalachian mountains (Bishop, 1943; Hairston, 1950).

Correspondence with Mr. Joseph, in an effort to clarify the above record has revealed that no specimens of the salamanders were collected and that the report was based upon identification by a third party. These facts cast grave doubt upon the validity of the record.

Nevertheless, when opportunities presented themselves in June and August of 1954, I visited Warner's Hollow to examine the salamander fauna at first hand. On the first occasion Mr. Joseph very kindly consented to guide me to the locations where, to the best of his recollection, the animals in question had been seen. Intensive searching by Mr. Joseph and me for seven hours on June 21st and by me for four hours on August 14th failed to turn up any specimens of either *Eurycea lucifuga* or *Plethodon jordani*. However, salamanders were found which might well have been mistaken for specimens of those two species.

In the general area where *Eurycea lucifuga* was purported to have been quite common, I collected a number of specimens of *Eurycea l. longicauda* (6 on June 21st, 12 on August 14th). Since no specimens of *E. lucifuga* were found, and since *E. l. longicauda* is certainly present in Warner's Hollow, it seems reasonable to conclude that the animals reported by Joseph were misidentified and were in reality *Eurycea l. longicauda*. Therefore, until more concrete evidence is at hand, *Eurycea lucifuga* must not be considered to range into northeastern Ohio.

The moisture-soaked debris beneath a dripping cliff was searched for specimens of *Plethodon jordani*, but without success. However, in this habitat was found a number of specimens of *Desmognathus o. ochrophaeus*, some of which were almost black in color. It is possible that similar dark specimens might in haste have been identified as *P. jordani* and that these were reported by Joseph. In any event, in the absence of specimens the report of *Plethodon jordani* in Ohio must be considered as erroneous.

Although not providing any species of great rarity, Warner's Hollow is indeed an excellent place for observation of a number of salamanders. In all, seven species were encountered on my two visits, and in all probability other species could be added in the cooler, damper months of the year. Species found are as follows:

1. *Notophthalmus viridescens viridescens* (Rafinesque).¹ Only four specimens of the Common Newt were found. They were all hidden under rocks, three in

¹For a discussion of the proper name for this form see Smith (1953).

TABLE 1
Comparison of Specimens of Eurycea bislineata

	SPECIMENS WITH COSTAL GROOVES NUMBERING:			DORSOLATERAL STRIPE ON TAIL MEASURING:			NUMBER OF VOMERINE TEETH:		
	14	15	16	<½ Tail Length	½ Tail Length	>½ Tail Length	Range	Mean	Std. Dev.
E. b. bislineata..... (data from Mittleman, 1949)...	0	110 (53%)	100 (47%)	occasionally	usually	rarely	8-21	12.2	3.07
Specimens from Warner's Hollow.....	0	32 (80%)	8 (20%)	in none*	in 4* (13%)	in 26* (87%)	9-28	15.0±.56	3.54±.40
E. b. rivicola..... (data from Mittleman, 1949)...	100 (81%)	23 (18.2%)	1 (0.8%)	—	—	in most	8-27	15	3.73

*of 30 specimens with nearly complete tails

the stream bed and one at the top of the gorge. Joseph's statement that this species is "most numerous" may refer to the situation in another season or in a moister summer than this.

2. *Desmognathus fuscus fuscus* (Rafinesque). Several specimens of the Dusky Salamander were found in moist situations along the stream, usually under rocks at the very edge of the water. This species is far less common than the following.

3. *Desmognathus ochrophaeus ochrophaeus* Cope. The Allegheny Mountains Salamander was by far the most abundant salamander encountered in the hollow. It was found under rocks and debris in and along the stream bed and in spring banks. In June when the slopes of the gorge were still rather moist this species could also be found some distance from the stream in company with *Plethodon c. cinereus* and *Plethodon g. glutinosus*.

4. *Plethodon cinereus cinereus* (Green). The Red-backed Salamander was fairly common on the damp sides of the hollow and a few were found in the woods above the gorge in June. Fifteen specimens were collected, all of which were of the striped phase. One of these, a female (snout-vent length=42 mm.), was found with a cluster of 6 eggs under a deeply embedded flat rock at the top of the gorge. The eggs were in an early stage of development with the neural folds just closing, which would seem to indicate that they were laid 5 or 6 days previously. None of this species was found in August, when the woodland floor was considerably drier than it had been earlier.

5. *Plethodon glutinosus glutinosus* (Green). A number of specimens of the Slimy Salamander were found in fairly moist situations along the stream bed and low on the slopes of the gorge wall.

6. *Eurycea bislineata* ssp. The Two-lined Salamander is commonly found under rocks in the stream bed. Forty specimens were collected and several times that number were seen but not taken.

The subspecific status of these animals is uncertain. It is problematical whether they should be considered as *E. bislineata bislineata* (Green), or *E. bislineata rivicola* Mittleman, or intermediate between these two subspecies. In his description of *E. b. rivicola*, Mittleman (1949 p. 96) says, "the range boundary of *rivicola* and *bislineata* in northeastern Ohio and western Pennsylvania [the state line in his map, Plate VI] is artificial; whether the two races interdigitate or replace each other abruptly in this region remains to be determined." Also, he says (p. 94) that two specimens from Meadville, Pa. are "quite typical *bislineata*." Since Warner's Hollow is situated only about 40 mi. west-southwest from Meadville, with the state line midway between the two locations, it is interesting to examine the present specimens with respect to the characters used by Mittleman to differentiate *E. b. rivicola* from *E. b. bislineata*. In table 1 measurements of the Warner's Hollow specimens are compared with the corresponding data for typical *E. b. bislineata* and *E. b. rivicola* as given by Mittleman (loc. cit.).

This tabulation of presumably diagnostic characters appears to indicate that the population in Warner's Hollow is closer to *E. b. bislineata* in respect to number of costal grooves, but closer to *E. b. rivicola* in respect to number of vomerine teeth and length of the dorsolateral stripe on the tail. Apparently then this population is intermediate in certain respects between the two forms. It seems possible, moreover, that in northeastern Ohio there is no sharp line of demarcation between the subspecies as described, but rather that there may be a fairly smooth gradation between the two, which, upon more critical analysis, might be resolved further into several clines of characters. The final solution to this problem can only be found by careful examination of extensive collections from a number of localities through Ohio and Pennsylvania.

7. *Eurycea longicauda longicauda* (Green). As mentioned above, 18 specimens of the Long-tailed Salamander were taken here. These were, without exception, found under rocks which were situated among coarse grass at the edge

of the stream. It would seem that in this locality the grassy habitat is preferred by this species since no specimens were found away from the grass even though similar conditions of rocky cover, moisture, and temperature exist at many other places in the Hollow.

The occurrence of *E. l. longicauda* in this locality emphasizes the fact that this species is very interesting from a biogeographical point of view. As Grobman (1944) points out, the northern boundary of the range of *E. l. longicauda* roughly parallels the southern limit of glaciation in the eastern U. S., but lies at some distance north of this limit (cf. Bishop, 1943, p. 422; Fenneman, 1938, p. 453). Apparently this species has been able, since the end of the last ice age, to extend its range northward along the Hudson, Susquehanna and Ohio river systems for varying distances. In most places this northward extension seems to have been much less than 100 mi., though in the broad Hudson River valley the species has been found at least 150 mi. north of the glacial drift border. Further, it appears that in only two recorded instances has the species been able to cross the divide into the Great Lakes drainage system. Bishop (1941) reports the occurrence of *E. l. longicauda* near Montour Falls, New York, a locality which is drained by Catharine Creek into Seneca Lake, thence via the Seneca and Oswego rivers into Lake Ontario. The present station in Warner's Hollow is along Phelps Creek, a tributary of the Grand River which flows into Lake Erie.

It may be of some significance that each of the divides here involved, i. e., the Seneca Lake—Chemung River and the Grand River—Mahoning River, has a rather gentle grade from the south and a maximum altitude only slightly in excess of 900 ft. Since this is so we might suspect that the species has entered the Great Lakes drainage across other divides which lie at about 900 ft. elevation or lower. Several such divides may be found in north central and northwestern Ohio and right across Indiana and Illinois; but we note further that most of these are 100 mi. or more from the glacial boundary, only one, namely that between Killbuck Creek and Black River in Medina County, Ohio, being less than 50 mi. north of the boundary. This latter region, which is similar to the Grand—Mahoning divide in respect both to elevation and to distance from the glacial boundary, might seem to be the only other really likely point of entrance of *E. l. longicauda* into the Great Lakes watershed. It seems pertinent to the discussion to point out here that the only known penetration of *Plethodon richmondi* into the Great Lakes drainage has been in this same region, i. e., into the Black River valley (Green and Walker 1954). Thus, we might with some confidence expect the occurrence of *P. richmondi* in Warner's Hollow as well as *E. l. longicauda* in the Black River valley.

The above discussion is admittedly based on very incomplete data. It should, however, demonstrate clearly that the biogeography of *E. l. longicauda* (and perhaps of other plethodontids) in Ohio and adjacent states would be an interesting and rewarding study.

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